

PATENT SPECIFICATION

DRAWINGS ATTACHED

978.639



978.639

Date of Application and filing Complete Specification Oct. 9, 1962.
No. 38136/62.

Application made in Germany (No. H439:5 V/37b) on Oct. 19, 1961.
Complete Specification Published Dec. 23, 1964.

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Index at acceptance: —EI V(59, 61)

International Classification: —E 04 c

COMPLETE SPECIFICATION

Wooden-flanged Beam with a Sinuous Web

I, HANNS HESS, of Wildenroth No. 108, Grafrath, Upper Bavaria, Germany, of German nationality, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed to be particularly described in and by the following statement:—

THIS INVENTION concerns a beam with wooden flanges and with a sinuous web comprising at least two sheets of plywood.

Wooden-flanged beams with sinuous plywood webs are already known. Beams of this kind are known in which two separate sinuous webs, each consisting of a single plywood sheet, engage in the flanges. It has been found, however, that for many purposes it is not sufficient to use one single-sheet web, because in many cases this web will not absorb transverse forces to the required extent. The single-sheet web can be made thicker, but this can be done only to a limited extent, because as the thickness of the material is increased difficulties are encountered in forming the web, which is not pre-shaped, into the sinuous shape.

In order to obviate the above disadvantages, and to make it possible to construct sinuous-webbed wooden-flanged beams with as large a carrying capacity as may be required, according to the present invention at least two plywood layers form parts of a single sinuous web and engage in the flanges. The multi-layered web is inserted under stress into grooves in the web and is glued into these grooves.

According to a further feature of the invention the sheets of the web, which of course may be connected to the flange independently of one another, are interconnected at intervals, preferably by gluing.

This glued connection may consist of glue which is applied in spots or strips to the contact surfaces of the web sheets before

the beam is assembled, and which sets after the beam has been assembled. If the glue is applied in strips, the glued connections may extend either transversely or parallel to the longitudinal axis of the beam, or both. In the case of a glue connection in the form of longitudinally extending strips, it is advisable to arrange these outside the region of the flange and to make their distances from the flange such that the clamping action of the plywood sheets in the flange grooves can exert a sufficient pressure on the glued connection to make this connection adequately strong. The gluing of the plywood sheets produces a bonded laminated web. The web may comprise at least one additional sheet made of a different material such as plastics or fibreboard and arranged between the plywood sheets.

According to a further feature of the invention, the top and bottom edges of the web may each be provided with a longitudinally extending slot; the ribs or tongues so produced then engage in two parallel grooves in each of the flanges.

This embodiment has the advantage that the depth to which the grooves have to be cut into flanges is only half as great as the depth necessary in the case of a single groove with the same glued surface area. The flanges can therefore be made thinner than in the case of single grooves. This results in further saving of wood. If the sheets of the web are not glued together, then they may be interconnected mechanically, for instance by pins, staples or the like, after the beam has been assembled.

If the web sheets are not glued into the flanges, then according to a further feature of the invention the flanges are interconnected by bolts extending transversely to the longitudinal axis of the beam; these bolts absorb tensile forces and ensure that the beam is held together.

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Embodiments of a wooden-flanged sinuous-webbed beam constructed in accordance with the invention are illustrated in the accompanying drawings, in which:

5 Figure 1 shows a vertical section through a wooden-flanged beam with a sinuous web, Figure 2 shows a horizontal section through the beam illustrated in Figure 1,

10 Figure 3 shows a vertical section through another embodiment of the wooden-flanged beam,

Figure 4 is a plan view of the lower web of the beam illustrated in Figure 3,

15 Figure 5 shows vertical sections, on a larger scale, through the top portion of one modified form of the beam and the bottom portion of another,

Figure 6 is a vertical section through another embodiment, and

20 Figure 7 is a vertical section, on a larger scale, through the top part of a beam with double grooves.

In the wooden-flanged beam shown in Figures 1 and 2, a plywood web 1 consisting of two sheets 2 and 2a engages in grooves 4 in webs 3. The plywood sheets of the web are interconnected by a glued joint 5 extending over the whole of the contacting surfaces. The glue is applied before the web is introduced into the grooves, and the web sheets are non-releasably interconnected by the glue after assembly.

During the assembly of the beam, the web sheets 2 and 2a are still displaceable relatively to one another, so that the operation of forming the web into a sinuous shape can be carried out without difficulty.

The mechanical force that has to be applied in order to deform the web is small, and breakage of the sheets of the web does not occur. Figure 2 shows the sinuous shape of the web between the flanges, in horizontal section. The web of the wooden-flanged beam shown in Figures 3 and 4 is made up of three sheets; these are also interconnected by the setting of the glue joints 5 after assembly.

In this case, the web sheets 2 and 2a consist of plywood, whereas the inner web layer 2b is a plastics plate. Instead of plastics it is of course also possible to use other material, for instance fibreboard, chip board or the like. In this beam, the edge parts of the web each have a central longitudinally extending slot. Two longitudinally extending ribs or tongues are thus formed on the bottom and on the top edge of the web; these engage in and are glued into grooves 4a. This arrangement has various advantages. Firstly, for a given groove depth the total area of glued surface of contact between web and flange is doubled. Therefore, either the magnitude of the forces that can be transmitted can be twice as great, or the depth of the grooves
65 can be reduced to one half of the depth that

is necessary in the case of a single groove as shown in Figure 1. This reduction of the groove depth brings the advantage that the flange is weakened to a very much smaller extent; also, the height of the flange can be reduced and its width increased, whereby the carrying capacity of the beam, or the saving in wood obtained by using this beam, can be increased. The bottom part of Figure 5 shows a section through the bottom end of the web and the bottom flange of a wooden-flanged beam in which the sheets 2 and 2a of the web are interconnected by gluing at intervals.

In this case, it is necessary to visualise this lower portion swung upwards so as to present a mirror image of itself. Then, there are two longitudinally extending strips of glue 5a between the sheets of the web. These glue connections are so close to the flange that the clamping action of the two web portions pressed together by the groove walls is sufficient to provide adequate bonding pressure for the glued surfaces. The interconnecting glue 5a may alternatively be applied only in rows of spots extending along the length of the beam.

In the beam of which the top part is shown in section in the top part of Figure 5, the sheets 2 and 2a are interconnected by means of a staple 6. This mechanical connecting means is applied after the beam has been assembled.

In the beam shown in section in Figure 6, the flanges are interconnected by a bolt 7. If bolts 7 are provided, the flanges do not need to be glued to the web.

Figure 7 is a sectional view showing a two-sheet web 1 engaging in two grooves in a flange 3. The ends of the web sheets 2 and 2a are cut into shapes such that a wooden tongue or rib 3a can be left between the grooves 4a; this tongue is used for transmission of forces.

The wedge-shaped grooves and web ends are of course so machined as to leave sufficient clearance, at the bottoms of the grooves, to permit sufficient flange pressure to be produced; i.e. to ensure that sufficient pressure can be produced between the web sheets and the sides of the grooves to ensure satisfactory gluing.

WHAT I CLAIM IS:—

1. A wooden-flanged beam in which at least two plywood sheets form parts of a single sinuous web and engage in the flanges.

2. A wooden-flanged beam with a sinuous web, as claimed in claim 1, characterised in that the web comprises at least one additional sheet, made of a different material such as fibreboard or plastics, and arranged between the plywood sheets.

3. A wooden-flanged beam with a sinuous web, as claimed in claim 1 or 2, characterised in that the multi-sheet web is inserted

under stress into grooves in the flanges and is glued to the flanges.

5 4. A beam as claimed in any one of claims 1 to 3, characterised in that the sheets of the web are interconnected at intervals, preferably by gluing.

10 5. A beam as claimed in any one of claims 1 to 3, characterised in that the sheets of the webs are interconnected by glue extending over the whole of the contacting surfaces.

15 6. A beam as claimed in any one of claims 1 to 3, characterised in that after the beam has been assembled the sheets of the web are interconnected by mechanical means such as pins or staples.

7. A beam as claimed in any one of claims 1 to 6, characterised in that the web has longitudinally slotted edges each engaging in a pair of parallel grooves in a respective one of the flanges. 20

8. A beam as claimed in any one of claims 1 to 7, characterised in that the flanges are interconnected by bolts.

9. Wooden-flanged beams with sinuous webs, substantially as hereinbefore described and illustrated in the accompanying drawings. 25

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Leamington Spa: Printed for Her Majesty's Stationery Office by the Courier Press.—1964.
Published at The Patent Office, 25, Southampton Buildings, London, W.C.2, from which copies may be obtained.

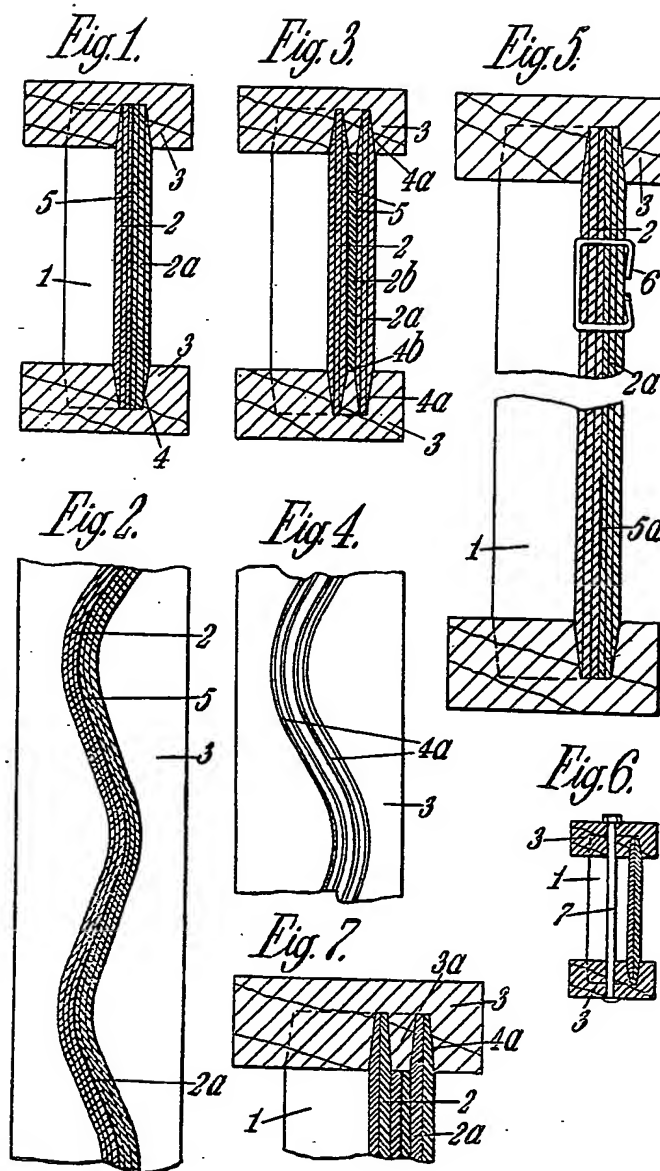
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COMPLETE SPECIFICATION

1 SHEET

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